## Fosphenytoin in the Emergency Department

FOSPHENYTOIN IS a phosphate ester pro-drug of phenytoin that is rapidly converted in plasma to phenytoin. Its safety profile and ease of use make it an attractive drug for the treatment of status epilepticus and seizure prophylaxis in the emergency department.

Parenteral phenytoin is poorly soluble in aqueous solutions and must be mixed with propylene glycol and alcohol and adjusted to a pH of 12 with sodium hydroxide to improve solubility and prevent precipitation. As a result, intravenous administration often causes burning, itching, or pain at the infusion site; commonly leads to phlebitis and cord formation; and may lead to soft tissue injury if it extravasates. Serious bradydysrhythmias and ventricular fibrillation have been associated with parenteral phenytoin administration. Hypotension may also occur, especially during rapid infusion rates. Fosphenytoin was developed in an attempt to circumvent these problems and eventually replace parenteral phenytoin.

Unlike intravenous phenytoin, fosphenytoin's solubility in aqueous solutions eliminates the need for propylene glycol and ethanol. The formulation is also less basic (pH, 8.6 to 9.0). Not surprisingly, symptoms of pain, burning, and itching at the infusion site occur much less frequently. Extravasation, when it occurs, is inconsequential. Patients receiving intravenous phenytoin or fosphenytoin experience similar adverse central nervous system side effects, which include nystagmus, ataxia, and somnolence.

Paresthesias and pruritus, however, are much more prevalent with fosphenytoin formulations. Pruritus, usually involving the face and perineum, has been reported in up to 50% of patients. In a single-dose, double blind study comparing the safety of intravenous fosphenytoin with intravenous phenytoin, fosphenytoin produced no substantial cardiac dysrhythmia or changes in heart rate. Serious lowering of blood pressure occurred infrequently, even during more rapid infusion rates.

To prevent confusion between fosphenytoin and phenytoin doses, the fosphenytoin product label expresses the dose concentration and infusion rate in terms of phenytoin equivalents (PE). For status epilepticus, the standard loading dose of fosphenytoin is 15 to 20 mg PE per kilogram, which can be infused at a rate of 100 to 150 mg PE per minute. This dose achieves phenytoin concentrations similar to parenteral phenytoin when an equivalent dose is given at a rate of 50 mg per minute. Fosphenytoin can also be given intramuscularly—it is well tolerated and consistently absorbed, with peak levels occurring at three hours.

Fosphenytoin's acquisition cost to hospital pharmacies ($90 for 1 gram of PE fosphenytoin, compared with $6 for 1 gram of phenytoin), combined with the manufacturer's decision to no longer produce parenteral dilantin, has generated significant discussion. The generic formulation, however, still plays a role in therapy, remains available, and continues to be manufactured. For patients who require relatively rapid therapeutic levels, but are alert enough to vocalize immediate adverse side affects at the infusion site, IV phenytoin remains an acceptable first-line treatment. Despite the controversy, to date, fosphenytoin's safety profile and ease of use surpasses that of phenytoin. Compared with phenytoin, fosphenytoin is the drug of choice for status epilepticus and for those patients with an altered mental status who would otherwise require IV phenytoin.

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## Adult Sexual Assault Examination

MUCH HAS changed in the medical treatment of adult victims of sexual assault in the last decade. Foremost among these changes are the use of allied health practitioner examiners, newer drug treatment regimens for sexually transmitted diseases and pregnancy prevention, and increased awareness of the need to treat the victim's emotional needs immediately.

In the past, examinations of adults after sexual assault were performed only by physicians. Currently, many are performed by nurses or nurse practitioners. The examinations may be performed in the emergency department or in an affiliated clinic. These programs are often called SANE/SART (sexual assault nurse examiners/sexual assault response team) programs. Advocates of these types of program feel they improve a victim's experience with the medical setting for several reasons. The practitioner performing the examination is specifically dedicated to treating the victim, not multiple patients in a busy emergency department. The practitioner has usually (but not always) completed more extensive training on sexual assault examinations and evidence collection and, as such, may perform an more appropriate examination. Advocates also feel that designated practitioners, because of their training and additional time available, consider the emotional needs of the victim more fully. The few critics of SANE/SART programs feel that only physicians should perform examinations on sexual assault patients and that some of the programs provide inadequate training to the examiners. Nurse examiner programs will doubtless continue to expand. Many areas still do not have SANE/SART programs, however, and physicians must stay current with treatment changes.

The pharmocologic treatment available for the prevention of sexual transmitted diseases (STD) and pregnancy has undergone many changes since the most recent edition of the Centers for Disease Control and Prevention

(CDC) guidelines were published in 1993. The guidelines include the use of intramuscular (IM) ceftriaxone and oral doxycyline. While this regimen is effective against gonorrhea, incubating syphilis, and chlamydia, it involves a painful and expensive IM injection and oral medicine twice daily for 7 days. Newer drug regimens are just as effective against gonorrhea and chlamydia and involve only one dose of two medications by mouth. Cefixime 400 mg or a quinolone (ciprofloxacin 500 mg or ofloxacin 400 mg) prevents infection with gonorrhea and azithromycin 1 gram prevents infection with chlamydia. New STD treatment guidelines for sexual assault victims should be released by the CDC within a year and will likely include the single-dose oral regimens.

Sexual transmission of Hepatitis B can be effectively prevented by the use of IM Hepatitis B immune globulin (HBIG) and vaccination if delivered within 14 days of exposure. This is expensive and not often used due to the low incidence of transmission from sexual assault.

Most US studies have found that woman's chances of acquiring human immunodeficiency virus (HIV) from penile vaginal penetration with an infected individual are between 0.5 to 1.5 per 1000 contacts. The rate for penile anal penetration is somewhat higher (8 to 32 per 1000 contacts with an infected individual). Sexual assault victims often sustain tissue injury due the violent nature of the act, however, and this may increase the transmission rate of the virus. Prophylaxis against infection after parenternal occupational exposure to infected body fluids has been recommended by recent studies, but there is no proof that intervention prevents HIV transmission through sexual contact. Furthermore, most victims of sexual assault come for treatment much later than those who have had occupational exposures, and the HIV status of the perpetrator is usually unknown. Nevertheless, most sexual assault victims fear contracting HIV after assault; they should receive counseling and be taught the option of taking anti-HIV medicines. A large-scale trial of AZT/3TC for 28 days post–sexual assault is now underway at the University of California in San Francisco. This regimen appears to be a logical choice in balancing side effects and possible efficacy.

All victims of sexual assault should be offered emergency contraception if they are not currently using a method of birth control that would prevent a pregnancy from the assault (such as routine hormonal contraception, an intrauterine device, or tubal ligation). In February 1997, the Food and Drug Administration published a list of effective emergency contraceptive regimens. They involve administering 2 doses of oral contraceptive pills, given within 72 hours of intercourse and spaced 12 hours apart. (One commonly used oral contraceptive for this purpose is two tablets of Ovral at the initial visit and two tablets 12 hours later.) These regimens will prevent at least 75% of pregnancies that would have otherwise occurred.

The importance of victim counselors has been recognized over the past decade. These counselors encourage victims to confront their pain, both in the immediate setting and in later sessions. Doing so can mean the difference between a healthy recovery and years of suffering with posttraumatic stress disorder. New 1997 California state legislation mandates medical personnel and law enforcement to inform sexual assault victims that they have the right to have a sexual assault victim counselor and at least one other support person of their choice present during the history-taking and physical examination. Just as victim counselors can have a tremendous impact on victims' recovery, so too can appropriate treatment by the medical examiner. Examiners must keep in mind that sexual assault victims have just had their body violated and their control taken away. They need to be assured that this will not happen again in the guise of a medical examination. Victims must be told repeatedly by the examiner that the patient is in control of the exam and to let the examiner know if anything hurts or doesn't make sense. They need to know that they have the right to refuse all or any portion of the exam. A supportive and caring physician can have a positive impact on a victim's recovery.

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## Treatment Of Deep Venous Thrombosis With Low Molecular Weight Heparins

STANDARD (UNFRACTIONATED) heparin is actually a mixture of sulfated polysacharrides with varying antithrombotic and anticoagulant activities. The molecular weight of unfractionated heparin ranges from 5000 to 30,000 daltons. Low molecular weight heparins (LMWHs), commercially produced from heparin using adepolymerization process, have a molecular weight of about 4000 to 6500 daltons. LMWHs have high bioavailability, long half-lives, and predictable, linear pharmacokinetics that allow for subcutaneous once- or twice-a-day dosing without the need to monitor anticoagulant effects. In addition, LMWHs carry a lower risk of bleeding because of fewer platelet interactions and less inhibition of platelet function, and because they do not increase vascular permeability or cause thrombocytopenia. LMWHs, though more expensive, have the potential to substantially reduce costs, primarily by decreasing the length of hospital stays.

A number of studies have compared LMWH to unfractionated heparin for the treatment of deep venous thrombosis. One study of deep venous thrombosis compared LMWH administered at home (usually after starting the drug in the hospital) to inpatient treatment with standard heparin and found LMWH to be effective and safe. Thirty-six percent of the patients receiving LMWH were not admitted to the hospital and 22% were dis-